IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Thomas A. EARLY et al.

Title: COMPONENT ANALYSIS OF MIXTURES BY NUCLEAR MAGNETIC RESONANCE

Appl. No.:   10/065,163

Filing Date: 09/23/2002
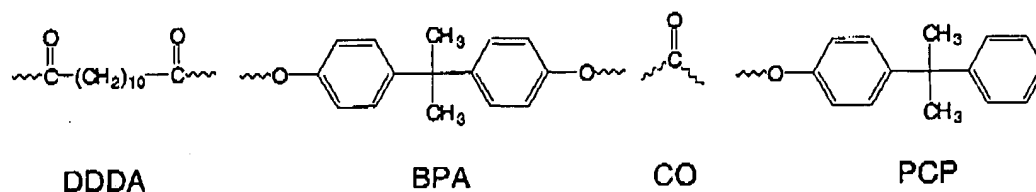
Examiner: Yelena G. Gakh

Art Unit: 1743

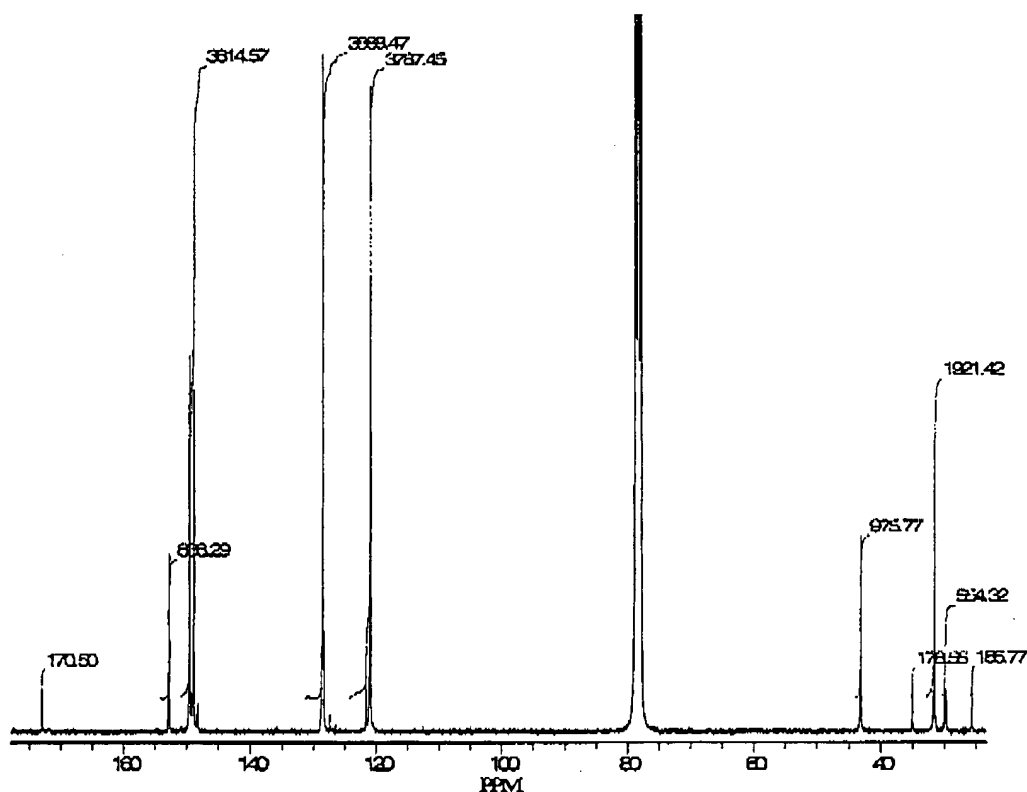### DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

I, Thomas A. Early, hereby declare that:

1.   I am a chemist at General Electric Co. I have conducted research in the fields of nuclear magnetic resonance (NMR) spectroscopy for over 20 years. My research includes the analysis and characterization of organic materials, including polymer systems, using NMR spectroscopy. My qualifications are set out in my *curriculum vitae*, which is attached hereto as APPENDIX A.

2.   I have reviewed and understood the subject patent application. I have also read and understood the Non-Final Office Action dated February 2, 2004.

3.   As the experimental data set forth below will show, the application, in fact, provides an enabling disclosure for determining the relative concentration of two or more components in a sample as claimed in claim 17. In particular, the data demonstrate that the method described and claimed in the application is easily applied to the analysis of polymers comprising a soft segment BPA polycarbonate—the subject matter of claims 12 and 20.

4.   A copolymer comprising a soft segment BPA polycarbonate was prepared using bisphenol A (BPA), dodecanedioic acid (DDDA), CO source, and the end-capper, *para*-cumylphenol (PCP):

DDDA   BPA   CO   PCP

5.   The molecular weight of the polymer thus produced is high. Consequently, the PCP concentration is low. Determining the PCP concentration is further complicated because it has a structure very similar to BPA and the resonances from these two components overlap severely.

6.   From the chemistry, the CO + DDDA concentration should be approximately equal to the BPA concentration.

7.   A quantitative ^{13}C spectrum of the polymer is shown below[1]:

8.   The large, off-scale triplet at 77 PPM is the solvent, CDCl₃. The spectrum is separated into ten integral regions. This meets the criteria that each integral be baseline resolved as discussed at

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[1] Conditions used to obtain this spectrum are those disclosed in the specification at paragraph [0024].

paragraph [0011] of the specification. Moreover, the criteria that the number of integrals (10) exceed the number of components (4) is also met. This criteria is discussed at paragraph [0014] of the specification.

9.   The overlap of BPA and PCP resonances is illustrated by the assignments given below in Table 1. From left-hand side of the spectrum to the right-hand side of the spectrum, contributions to each integral region from each component are as follows:

Table 1

Integral	DDDA	BPA	CO	PCP
170.50	2	0	0	0
838.29	0	0	1	0
3814.57	0	4	0	3
3888.47	0	4	0	7
3787.45	0	4	0	2
975.77	0	1	0	1
178.55	2	0	0	0
1921.42	0	2	0	2
554.32	6	0	0	0
185.77	2	0	0	0

10.   Even though the overlap between BPA and PCP is severe, the relative concentrations of each component can be measured because the assignment columns from PCP and BPA are not linear combinations of each other or other components. *See* paragraph [0017] of the specification.

11.   Using a commercially available spreadsheet program to analyze the data shown in Table 1, it is easily discerned that, as expected, the BPA contribution is nearly equal to the sum of the DDDA and CO (carbonate) contribution.[2]

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[2]Integral intensities are in arbitrary units. Least squares fit of the data is shown below the overall standard error. A normalized fit is show below that.

BPA/DDDA copolymer

Integral #	DDDA	Components BPA	CO	PCP	Integral	Calculated	Residual	Std.Resid.
1	2.00	0.00	0.00	0.00	170.50	183.15	-12.65	-1.27
2	0.00	0.00	1.00	0.00	838.29	838.29	0.00	0.00
3	0.00	4.00	0.00	3.00	3814.57	3812.79	1.78	0.18
4	0.00	4.00	0.00	7.00	3888.47	3891.63	-3.16	-0.32
5	0.00	4.00	0.00	2.00	3787.45	3793.08	-5.63	-0.57
6	0.00	1.00	0.00	1.00	975.77	958.12	17.65	1.77
7	2.00	0.00	0.00	0.00	178.55	183.15	-4.60	-0.46
8	0.00	2.00	0.00	2.00	1921.42	1916.25	5.17	0.52
9	6.00	0.00	0.00	0.00	554.32	549.45	4.88	0.49
10	2.00	0.00	0.00	0.00	185.77	183.15	2.62	0.26
Total	12.00	15.00	1.00	15.00	16315.11	16309.04	6.07	0.61

Std.Err.   9.955647766

Componen	Coeff.	Error	T	P-value
DDDA	91.57	1.44	63.73	1E-09
BPA	938.41	2.99	313.68	7.08E-14
CO	838.29	9.96	84.20	1.89E-10
PCP	19.71	2.66	7.41	0.000311
Sum of Coe	1887.988129			

Normalized Summary			Include?
DDDA	4.850357122	0.076111388	yes
BPA	49.70444188	0.158454914	yes
CO	44.40123257	0.527315168	yes
PCP	1.043968429	0.140930907	yes

100 Normalized Sum

Component Analysis - Version 1.2
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12.   I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issuing thereon.

Respectfully submitted,

Date _April 27, 2004_   By _Thomas A. Early_

Thomas A. Early, Ph.D.

APPENDIX A

Curriculum Vitae of Thomas A. Early

EDUCATION

University/College	Degree	Major	Grad Yr.	Location
Colorado State University, Fort Collins, CO	Post Doctorate	Chemistry, Physical	1982	USA
University of California, San Diego, La Jolla, CA	Doctorate	Chemistry, Physical	1980	USA
University of California, Riverside, Riverside, CA	Masters	Chemistry	1975	USA
University of California, Riverside, Riverside, CA	Bachelors	Chemistry	1973	USA

EMPLOYMENT

From Business	To	Job Title	Function Location
11/1999 GE Corporate - Americas		Master Black Belt	Engineering Niskayuna NY US
08/1991 GE CRD	11/2000	Chemist	Engineering Niskayuna, NY
01/1990 GE NMR Instruments	07/1991	Applications Manager	Engineering Freemont, CA
07/1988 GE NMR Instruments	12/1989	Senior Application Scientist	Engineering Fremont, CA
05/1986 GE NMR Instruments	06/1988	Application Scientist	Engineering Fremont, CA
04/1983 GE NMR Instruments	05/1986	NMR Instrument Product Manager	Marketing/Product Development Fremont, CA
09/1982 Nicolet Magnetics Corp.	03/1983	Western Regional Sales Manager	Sales Fremont, CA